The Effectiveness of Unconventional Monetary Policy: Evidence from Japan

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Introduction

- Since the global financial crisis, central bankers around the world have abandoned conventional monetary policy tools in favor of unconventional monetary policy (UMP) tools
  - Quantitative Easing (QE)
  - Forward Guidance
  - Negative Interest Rates
- Japan, which faced a crisis in its banking sector and came up against the zero lower bound on interest rates nearly a decade earlier, was a pioneer in the use of many of these unconventional policy tools
- Our paper analyzes the effectiveness of Japan's bold experiment with unconventional monetary policy

QE: How it Works in Theory

Transmission mechanism through the bank lending channel

- Central bank creates new money to purchase large amounts of assets from commercial banks
- Commercial bank liquidity ↑
- Interest rates ↓
- Borrowing by business and households ↑
- Investment ↑
- Growth and inflation ↑

Research Question & Empirical Approach

- Was UMP – and QE in particular – effective at stimulating bank lending in Japan?
- We analyze the effectiveness of QE policies on the bank lending channel of monetary policy transmission by using a panel of bi-annual bank data from 109 Japanese banks over the period 1996-2015

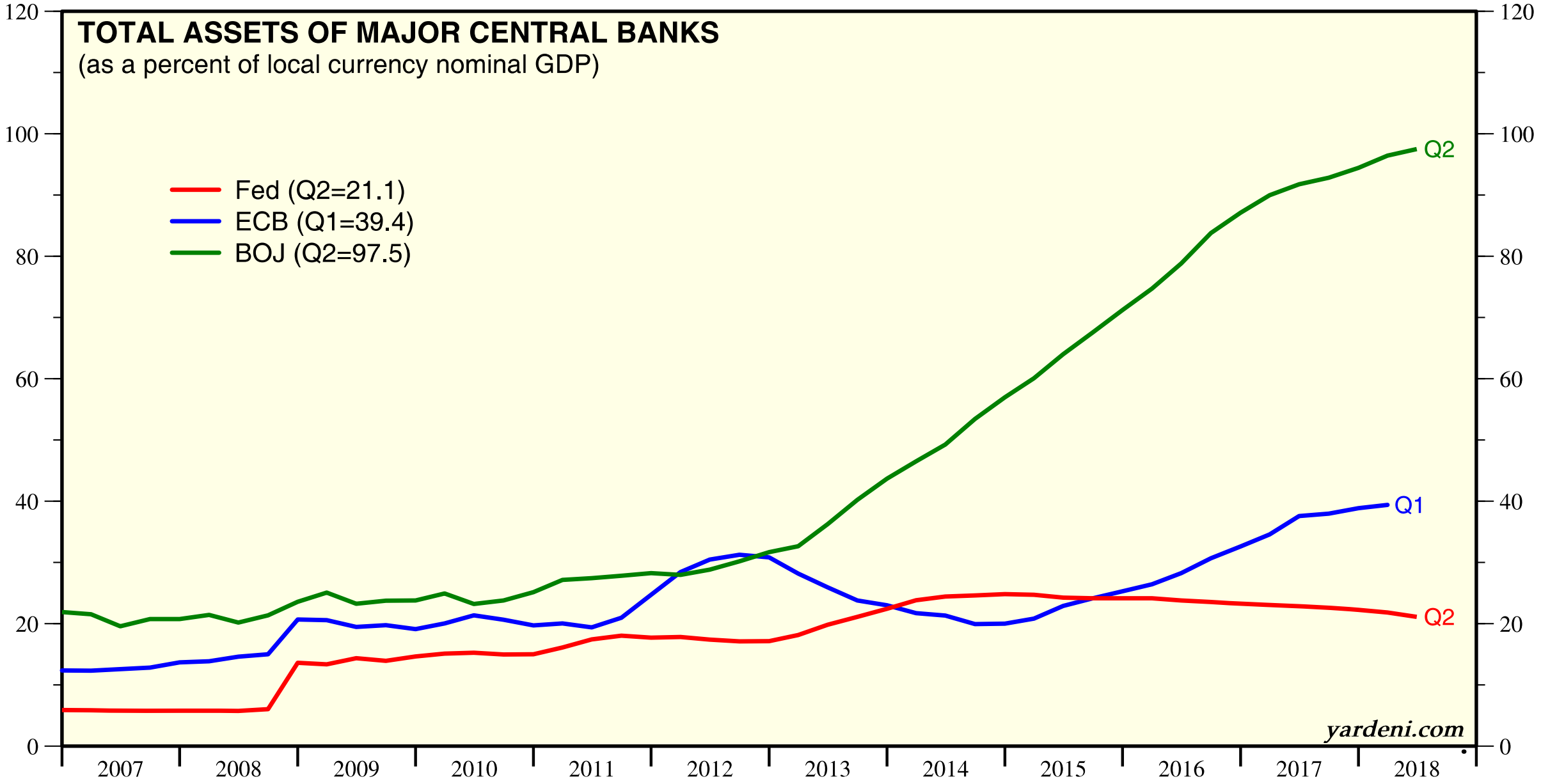
Background: Japan as a Pioneer of UMP

- Forward Guidance & “Zero-Interest Rate Policy” (ZIRP)
  - In February 1999, BoJ Governor Hayami committed to keep the uncollateralized overnight interbank rate at zero “until deflationary conditions subside”
  - February 1999-August 2000, February 2001-July 2006

- “QE1”
  - Between March 2001 and March 2006, the targeted balance of the BoJ’s current account was raised several times (first to ¥ 5 trillion, later to ¥ 30-35 trillion)
  - The BoJ expanded its balance sheet by 32.1% from ¥ 115.3 trillion to ¥ 152.3 trillion
  - Purchases consisted of JGBs and short-dated financing bills or promissory notes (“*tegata*”) predominantly from banks
  - Between 2001 and 2006, the monetary base expanded by 70%

- “QE2”
  - Reluctant adoption of QE by Governor Shirakawa
    - Greenwood (2017): “Shirakawa was a reluctant expansionist”
  - Expansion of the BoJ’s balance sheet through asset purchases by 35.5% from ¥ 121 trillion in October 2010 to ¥ 164 trillion in March 2013
    - At the end of QE2, the BoJ’s balance sheet was only slightly larger than at the end of QE1 (¥ 164 trillion compared with ¥ 152 trillion)
  - The main assets purchased were JGBs and *tegata*, but also Tokyo-listed Exchange Traded Funds (ETFs) and Real Estate Investment Trusts (REITs)

- Qualitative *and* Quantitative Easing (QQE)
  - Appointment of Governor Kuroda by PM Abe in March 2013
  - 2-2-2 plan: within two years, the monetary base would be doubled and a new inflation target of 2% would be reached
  - From April 2013, the BoJ purchased assets to increase the monetary base at a rate of ¥ 60 trillion per year, and ¥ 80 trillion per year from November 2014
  - BoJ purchases of JGBs and other securities, mainly from banks
- QQE with Negative Interest Rate (NIRP)
  - Since January 2016, the BoJ applies a negative interest rate of –0.1% to current accounts, which financial institutions hold at the BoJ
- QQE with Yield Curve Control ("NIRP2")
  - In September 2016, BoJ committed to keep 10-year JGB rate below zero


TOTAL ASSETS OF MAJOR CENTRAL BANKS
(as a percent of local currency nominal GDP)
Fed (Q2=21.1)
ECB (Q1=39.4)
BOJ (Q2=97.5)
Q2
Q1
Q2
yardeni.com
120
100
80
60
40
20
0
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

Data and Methodology

- We use panel data of 109 Japanese banks' balance sheet and financial statements for the period 1996—2015 from the Japanese Bankers Association (JBA)
- The data frequency is semi-annual, as balance sheet and financial statement information is reported every September and March
  - NB: Japan's fiscal year runs from April 1 to March 31
- Our panel of data includes a total of 4,003 observations

Summary Statistics

Variable Name	Mean	SD	Min	Max
Loan Growth (log change, %)	0.85%	5.24	-103.73%	84.43%
Liquidity Ratio (%)	6.64%	3.91	1.13%	54.85%
Total Assets (log, million yen)	14.67	1.23	10.38	19.12
Total Deposits (log, million yen)	14.45	1.38	4.01	18.70
Equity Ratio (%)	5.04%	4.93	-78.82	79.83
Bad Loan Ratio (%)	81.79	95.55	-612.47	1,916.83
No. of Banks (i)	109			
No. of Time Periods (t)	40			
No. of Observations	4,003			

Econometric Specification

β_1 is the main parameter of interest: if monetary policy is effective, the estimate of β_1 will be positive and statistically significant, indicating that a higher bank liquidity ratio leads to higher bank loan growth

$$\Delta L_{i,t+1} = \beta_0 + \beta_1 LR_{i,t} + \beta_2 X_{i,t} + \varepsilon_{i,t+1}$$

where:

- $\Delta L_{i,t+1}$: log change of loans for bank i at time $t+1$
- $LR_{i,t}$: liquidity ratio of bank i at time $t+1$, defined as the ratio of liquid assets ("cash and due from banks" plus "call loans") divided by total assets
- $X_{i,t}$: vector of control variables for bank i at time $t+1$, including
  - log of total assets
  - log of total deposits
  - equity ratio (ratio of bank equity to total assets)
  - bad loan ratio (ratio of bad loans to total bank equity)
- $\varepsilon_{i,t+1}$: error term for bank i at time $(t+1)$

2nd Specification to Check for Bank Health

- $\Delta L_{i,t+1} = \beta_0 + \beta_1 LR_{i,t} + \beta_2 LR_{i,t} x\ BH_{i,t} + \beta_3 X_{i,t} + \varepsilon_{i,t+1}$

where

- BH: dummy for healthy banks, defined as banks with an equity ratio above the sample mean
- and all other variables are defined as above

Econometric Methodology

- Pooled OLS, with Bank Type Dummies, Time Dummies, and both Bank Type and Time Dummies
- Panel Data Analysis with Individual Fixed Effects and Time Fixed Effects
- Generalized Method of Moments Analysis

Empirical Results: The effect of higher bank liquidity ratios on loan growth

Dependent Variable: Loan Growth $\Delta L_{i,t+1}$					
	POLS	Individual FE	Time FE	Two Step System GMM	Two Step Difference GMM
	(1)	(2)	(3)	(4)	(5)
Constant Term	-0.00				
	(0.01)				
Liquidity Ratio	0.06**	0.14***	0.06***	0.15**	0.19
	(0.03)	(0.03)	(0.03)	(0.08)	(0.12)
Log Total Assets	0.00	-0.05***	0.00	0.00	-0.06
	(0.00)	(0.01)	(0.00)	(0.00)	(0.06)
Equity Ratio	0.08	0.53***	0.06	0.04	1.23**
	(0.06)	(0.10)	(0.06)	(0.20)	(0.50)
Bad Loan Ratio	-0.01***	-0.01***	-0.00***	-0.00	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
No. Obs.		2,460	2,460	4,003	2,172

- The results indicate that UMP was effective during the period of our study
- For nearly all empirical methodologies – pooled OLS, panel data with individual fixed effects or time fixed effects, and for GMM – the coefficient estimate of interest is positive and highly statistically significant at the 5% or even 1% level
- This suggests that banks with relatively higher liquidity ratios in a given period tend to have statistically significantly higher loan growth in the following period
- The size of the parameter estimate more than doubles when individual bank fixed effects are accounted for in column (2), and when we address the possibility of endogeneity due to a lagged dependent variable on the right hand side through two-step system GMM analysis

The effect of higher bank liquidity ratios on loan growth – controlling for bank health

Dependent Variable: Loan Growth $\Delta L_{i,t+1}$					
	POLS	POLS with Bank Type Dummies	Time FE	Two Step System GMM	Two Step Difference GMM
Independent Variables	(1)	(2)	(3)	(4)	(5)
Constant Term	-0.00	-0.01	-0.01		
	(0.01)	(0.02)	(0.01)		
Liquidity Ratio	0.08***	0.08***	0.08***	0.18**	0.15
	(0.03)	(0.03)	(0.03)	(0.09)	(0.12)
Log Total Assets	0.00	0.00	0.00	0.00	-0.06
	(0.00)	(0.00)	(0.00)	(0.00)	(0.09)
Equity Ratio	0.15**	0.19***	0.13*	0.05	1.18***
	(0.07)	(0.07)	(0.06)	(0.21)	(0.49)
Bad Loan Ratio	-0.01***	-0.01***	-0.01***	-0.01	-0.01
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Liquidity Ratio x Healthy Bank Dummy	-0.07**	-0.07**	-0.07**	-0.12*	-0.07
	(0.03)	(0.03)	(0.03)	(0.07)	(0.08)
No. Obs.		2,460	2,460	4,003	2,172

- The previous results are largely confirmed
  - Banks with relatively higher liquidity ratios in a given period tend to have statistically significantly higher loan growth in the following period
- The coefficient estimate on the interaction term of each individual banks' liquidity ratio at time t and the $HealthyBank$ dummy variable is highly statistically significantly *negative*
- This indicates that UMP was effective overall, but was relatively less effective at stimulating lending by healthy banks that were meeting their regulatory capital ratio requirement
- Put differently, the results suggest that although UMP was effective overall, the lending stimulated by providing banks with higher liquidity was mostly lending by sick, undercapitalized banks
  - Will this have adverse impact on financial stability?

(Preliminary) Conclusions

- Our preliminary results indicate that UMP is effective, although the impact on bank lending is quantitatively small
- Interestingly, the UMP seems to be particularly encouraging increased lending from sick, undercapitalized banks
- This raises questions as to the appropriateness of the policy implementation and the long-term implications of the policy for the banking sector and macroeconomy as a whole